

# **Exhibit 24**

# 3GPP TS 23.228 V8.12.0 (2010-03)

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*Technical Specification*

## **3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS); Stage 2 (Release 8)**



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- between BGCF/IMS ALG and BGCF (Mk), and
- between BGCF/CSCF and IBCF (Mx).

Protocols for the Mw, Mm, Mg, Mi, Mj, Mk, Mx:

- The single session control protocol applied to these interfaces will be based on SIP (as defined by IETF RFC 3261 [12], other relevant IETF RFC's, and additional enhancements required to support 3GPP's needs).

UNI vs. NNI session control :

- The SIP based signalling interactions between CN elements may be different than SIP based signalling between the UE and the CSCF.

Based on operator preference, border control functions may be applied between two IM CN subsystem networks or between an IM CN subsystem network and other SIP based multimedia network, see clause 4.14 and Annex I for details.

Restrict access from external networks :

- The signalling solution shall allow the operator to restrict access from external networks (application level).

Access to HSS :

- A network operator can control access to the HSS.

## 4.5 Mobility related concepts

The following procedures are supported by an UE when accessing IMS:

- Connect to the IP-CAN and acquire the necessary IP address, which includes, or is followed by, the P-CSCF discovery procedure. The mobility related procedures and IP address management principles for the IP-CAN are described in the relevant IP-CAN specifications;
- Register to the IM subsystem as defined by the IMS registration procedures;
- If an UE explicitly deactivates the IP-CAN bearer that is being used for IMS signalling, it shall first de-register from the IMS (while there is no IMS session in progress);
- If an UE explicitly deactivates the IP-CAN bearer that is being used for IMS signalling while an IMS session is in progress, the UE must first release the session and de-register from the IMS and then deactivate the IP-CAN bearers;
- If an UE changes its IP address according to IP-CAN procedures (e.g. TS 23.221 [7]), the UE shall re- register in the IMS by executing the IMS registration;
- If an UE acquires an additional IP address due to establishing an additional IP-CAN bearer through a different access network, the UE may perform an IMS registration using this IP address as the contact address. If IMS registration is performed, this IMS registration may co-exist with the previous IMS registration from this UE and the UE shall be notified that this IMS registration results in multiple simultaneous registrations.
- In order to be able to deliver an incoming IMS session, the IP-CAN bearer that is being used for IMS signalling need to remain active as long as the UE is registered in the IM CN subsystem;

## 4.6 Roles of Session Control Functions

### 4.6.0 General

The CSCF may take on various roles as used in the IP multimedia subsystem. The following clauses describe these various roles.

13. The UE may indicate its capabilities and characteristics in terms of SIP User Agent capabilities and characteristics described in IETF RFC 3840 [38] during IMS registration. The UE may also update its capabilities by initiating a re-registration when the capabilities are changed on the UE.
14. If a UE supports GRUU, the UE shall indicate its support for GRUUs and obtain a P-GRUU and a T-GRUU for each registered Public User Identity during IMS registration as described in RFC 5627 [49].
15. The P-CSCF may subscribe to notifications of the status of the IMS Signalling connectivity after successful initial user IMS Registration.
16. When the access network type information is available from the access network, the P-CSCF shall ensure that the IMS registration request received from the UE to the SIP server (e.g. S-CSCF) contains the correct information. The P-CSCF may subscribe to notification of changes in the type of access network.
17. The P-CSCF shall cancel any active subscription e.g. to notifications of the status of the IMS Signalling connectivity and/or of the change of access network type when the user is de-Registered from the IM CN subsystem.

## 5.2.1a Implicit Registration

### 5.2.1a.0 General

When an user has a set of Public User Identities defined to be implicitly registered via single IMS registration of one of the Public User Identity's in that set, it is considered to be an Implicit Registration. No single public identity shall be considered as a master to the other Public User Identities. Figure 5.0c shows a simple diagram of implicit registration and Public User Identities. Figure 5.0d shows a similar diagram when multiple Private User Identities are involved. In order to support this function, it is required that:

- HSS has the set of Public User Identities that are part of implicit registration.
- Cx reference point between S-CSCF and HSS shall support download of all Public User Identities associated with the implicit registration, during registration of any of the single Public User Identities within the set.
- All Public User Identities of an Implicit Registration set must be associated to the same Private User Identities. See figure 5.0d for the detailed relationship between the public and private user entities within an Implicit Registration set.
- When one of the Public User Identities within the set is registered, all Public User Identities associated with the implicit registration set are registered at the same time.
- When one of the Public User Identities within the set is de-registered, all Public User Identities that have been implicitly registered are de-registered at the same time.
- Registration and de-registration always relates to a particular contact address and a particular Private User Identity. A Public User Identity that has been registered (including when implicitly registered) with different contact addresses remains registered in relation to those contact addresses that have not been de-registered.
- Public User Identities belonging to an implicit registration set may point to different service profiles; or some of these Public User Identities may point to the same service profile.
- When a Public User Identity belongs to an implicit registration set, it cannot be registered or de-registered individually without the Public User Identity being removed from the implicit registration list.
- All IMS related registration timers should apply to the set of implicitly registered Public User Identities
- S-CSCF, P-CSCF and UE shall be notified of the set of Public User Identities belonging to the implicitly registered function. Session set up shall not be allowed for the implicitly registered Public User Identities until the entities are updated, except for the explicitly registered Public User Identity.
- The S-CSCF shall store during registration all the Service profiles corresponding to the Public User Identities being registered.
- When a Public User Identity is barred from IMS communications, only the HSS and S-CSCF shall have access to this Public User Identity.

### 5.2.2.2 Assumptions

The following are considered as assumptions for the registration procedures as described in clause 5.3.2.3:

1. IP-CAN bearer is already established for signalling and a mechanism exists for the first REGISTER message to be forwarded to the proxy.
2. The I-CSCF shall use a mechanism for determining the Serving-CSCF address based on the required capabilities. The I-CSCF obtains the name of the S-CSCF from its role as an S-CSCF selector (Figure 5.1) for the determination and allocation of the Serving-CSCF during registration.
3. The decision for selecting the S-CSCF for the user in the network is made in the I-CSCF.
4. A role of the I-CSCF is the S-CSCF selection.

In the information flows described in clauses 5.2.2.3 and 5.2.2.4, there is a mechanism to resolve a name and address. The text in the information flows indicates when the name-address resolution mechanism is utilised. These flows do not take into account security features such as user authentication. The description of the impact of IMS security features is done in TS 33.203 [19].

### 5.2.2.3 Registration information flow – User not registered

The application level registration can be initiated after the registration to the access is performed, and after IP connectivity for the signalling has been gained from the access network. For the purpose of the registration information flows, the user is considered to be always roaming. For user roaming in their home network, the home network shall perform the role of the visited network elements and the home network elements.

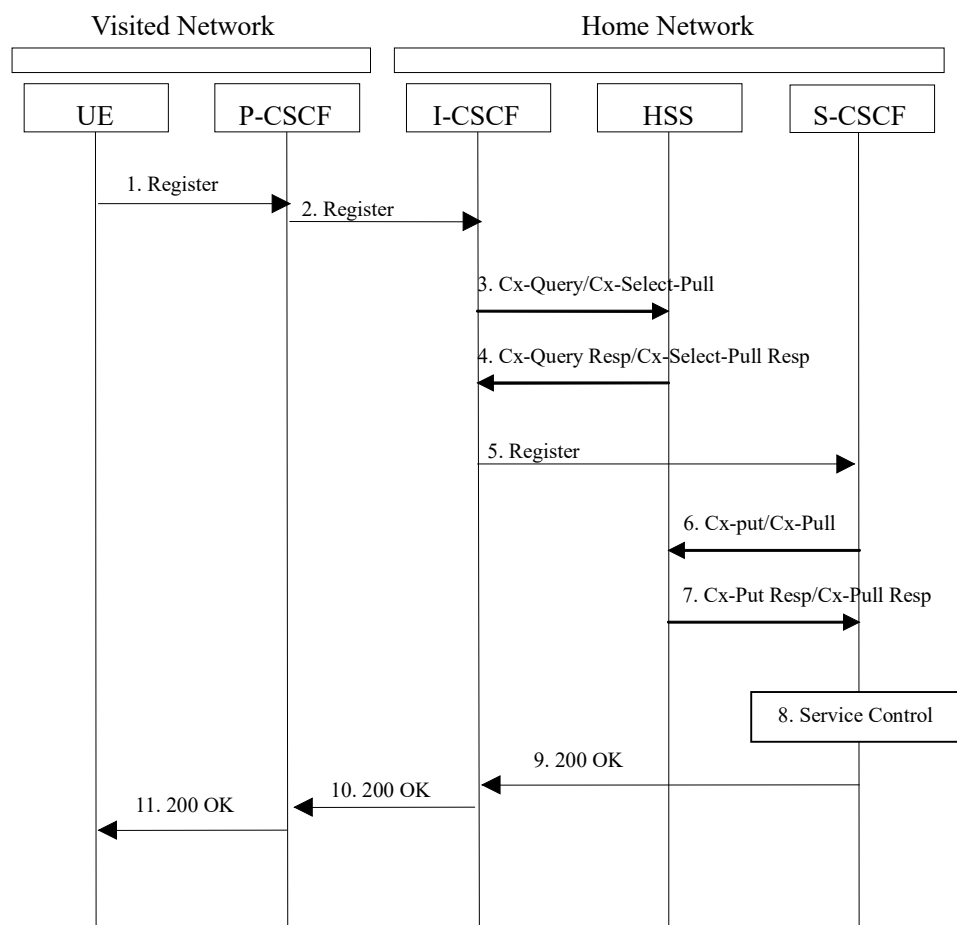


Figure 5.1: Registration – User not registered

1. After the UE has obtained IP connectivity, it can perform the IM registration. To do so, the UE sends the Register information flow to the proxy (Public User Identity, Private User Identity, home network domain name, UE IP address, Instance Identifier, GRUU Support Indication).
2. Upon receipt of the register information flow, the P-CSCF shall examine the "home domain name" to discover the entry point to the home network (i.e. the I-CSCF). The proxy shall send the Register information flow to the I-CSCF (P-CSCF address/name, Public User Identity, Private User Identity, P-CSCF network identifier, UE IP address). A name-address resolution mechanism is utilised in order to determine the address of the home network from the home domain name. The P-CSCF network identifier is a string that identifies at the home network, the network where the P-CSCF is located (e.g., the P-CSCF network identifier may be the domain name of the P-CSCF network).
3. The I-CSCF shall send the Cx-Query/Cx-Select-Pull information flow to the HSS (Public User Identity, Private User Identity, P-CSCF network identifier).

The HSS shall check whether the user is registered already. The HSS shall indicate whether the user is allowed to register in that P-CSCF network (identified by the P-CSCF network identifier) according to the User subscription and operator limitations/restrictions if any.

4. Cx-Query Resp/Cx-Select-Pull Resp is sent from the HSS to the I-CSCF. It shall contain the S-CSCF name, if it is known by the HSS, or the S-CSCF capabilities, if it is necessary to select a new S-CSCF. When capabilities are returned the I-CSCF shall perform the new S-CSCF selection function based on the capabilities returned.

If the checking in HSS was not successful the Cx-Query Resp shall reject the registration attempt.

5. The I-CSCF, using the name of the S-CSCF, shall determine the address of the S-CSCF through a name-address resolution mechanism. The I-CSCF also determines the name of a suitable home network contact point, possibly based on information received from the HSS. I-CSCF shall then send the register information flow (P-CSCF address/name, Public User Identity, Private User Identity, P-CSCF network identifier, UE IP address) to the selected S-CSCF. The home network contact point will be used by the P-CSCF to forward session initiation signalling to the home network.

The S-CSCF shall reject the registration if the number of registered contact addresses for a Public User Identity from the same UE exceeds the limit of simultaneous registrations configured at the S-CSCF. The S-CSCF shall store the P-CSCF address/name, as supplied by the visited network. This represents the address/name that the home network forwards the subsequent terminating session signalling to the UE. The S-CSCF shall store the P-CSCF Network ID information.

6. The S-CSCF shall send Cx-Put/Cx-Pull (Public User Identity, Private User Identity, S-CSCF name) to the HSS.
7. The HSS shall store the S-CSCF name for that user and return the information flow Cx-Put Resp/Cx-Pull Resp (user information) to the S-CSCF. The user information passed from the HSS to the S-CSCF shall include one or more names/addresses information which can be used to access the platform(s) used for service control while the user is registered at this S-CSCF. The S-CSCF shall store the information for the indicated user. In addition to the names/addresses information, security information may also be sent for use within the S-CSCF.
8. Based on the filter criteria, the S-CSCF shall send register information to the service control platform and perform whatever service control procedures are appropriate.
9. The S-CSCF shall return the 200 OK information flow (home network contact information, a GRUU set) to the I-CSCF.
10. The I-CSCF shall send information flow 200 OK (home network contact information, a GRUU set) to the P-CSCF. The I-CSCF shall release all registration information after sending information flow 200 OK.
11. The P-CSCF shall store the home network contact information, and shall send information flow 200 OK (a GRUU set) to the UE. The P-CSCF may subscribe at the PCRF to notifications of the status of the IMS Signalling connectivity (see TS 23.203 [54] for more details).

#### 5.2.2.4 Re-Registration information flow – User currently registered

Periodic application level re-registration is initiated by the UE either to refresh an existing registration or in response to a change in the registration status of the UE. A re-registration procedure can also be initiated when the capabilities of the UE have changed or the IP-CAN has changed. Re-registration follows the same process as defined in clause 5.2.2.3

11. Based on a timeout or other indications, UE#2 decides the current session should be redirected to a new destination URI. This new destination URI may be a phone number, an email address, a web page, or anything else that can be expressed as a URI. The Redirect response is sent to P-CSCF#2.
12. P-CSCF#2 shall revoke any authorization for QoS for the current session.
13. P-CSCF#2 forwards the Redirect response to S-CSCF#2.
14. S-CSCF#2 invokes whatever service logic is appropriate for this session redirection. If UE#2 does not subscribe to session redirection service, or did not supply a new destination URI, S-CSCF#2 service logic may supply one or may terminate the session setup attempt with a failure response. The new destination URI may be a phone number, an email address, a web page, or anything else that can be expressed as a URI. If S-CSCF#2 service logic requires that it remain on the path for the redirected request, the service logic generates a private URI, addressed to itself, as the new destination.
15. S-CSCF#2 sends a SIP Redirect response back to I-CSCF, containing the new destination URI.
16. I-CSCF sends a Redirect response back to S-CSCF#1, containing the new destination.
17. S-CSCF#1 service logic may check the number of redirections that have occurred for this session setup attempt, and if excessive, abort the session. If S-CSCF#1 service logic requires that UE#1 not know the new destination URI, the service logic stores the new destination information, generates a private URI addressed to itself pointing to the stored information, and generates a modified Redirect response with the private URI.
18. S-CSCF#1 sends the Redirect response to P-CSCF#1
19. P-CSCF#1 revokes any authorization for QoS for the current session and sends the Redirect response to UE#1.
20. UE#1 initiates a new INVITE request to the address provided in the Redirect response. The new INVITE request is sent to P-CSCF#1
21. P-CSCF#1 forwards the INVITE request to S-CSCF#1
22. S-CSCF#1 invokes whatever service logic is appropriate for this new session setup attempt. The service logic may retrieve destination information if saved in step #17.
23. S-CSCF#1 determines the network operator of the new destination address. If the service logic in step #14 did not provide its private URI as a new destination, the procedure continues with step #26, bypassing steps #24 and #25. If the service logic in step #14 did provide a private URI as a new destination, the INVITE message is sent to I-CSCF#2, the I-CSCF for S-CSCF#2.
24. I-CSCF forwards the INVITE to S-CSCF#2.
25. S-CSCF#2 decodes the private URI, determines the network operator of the new destination, and sends the INVITE request to the I-CSCF for that network operator.
- 26-30. The remainder of this session completes as normal.

## 5.11.6 Session Transfer Procedures

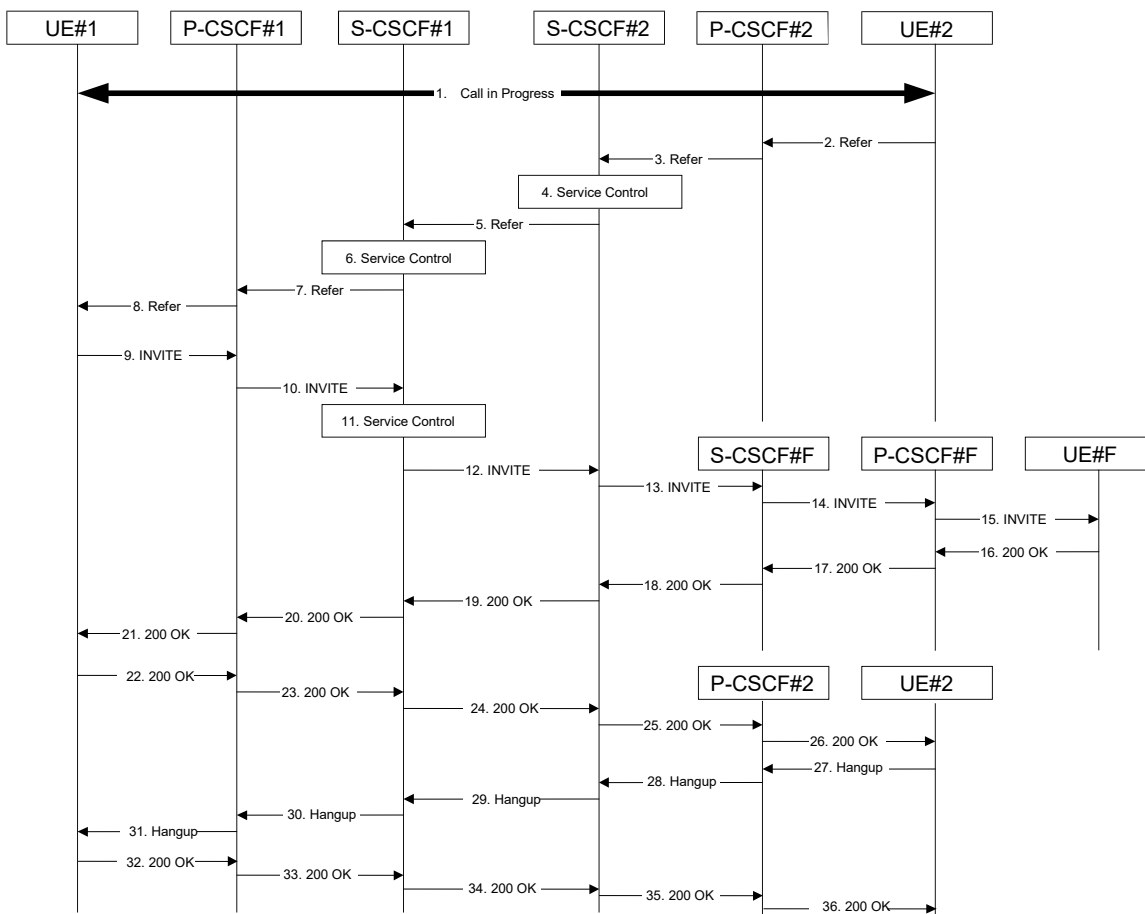
### 5.11.6.0 General

This clause gives information flows for the procedures for performing session transfers. This is presented in two steps: first a basic primitive that can be used by endpoints to cause a multi-media session to be transferred, and second the procedures by which this primitive can be used to implement some well-known session-transfer services.

#### 5.11.6.1 Refer operation

The refer primitive is an information flow indicating a "Refer" operation, which includes a component element "Refer-To" and a component element "Referred-By". The end point receiving a referral may be UE#1 as shown in the example flow in figure 5.42 or it may be any other type of originating entity as defined in clause 5.4a. The referring endpoint may be either UE#2 as shown, an Application Server or a non-IMS network SIP client. The referred-to destination may be UE#F as shown in figure 5.42 or it may be any other type of terminating entity as defined in clause 5.4a. Only the scenario in which a call from the first UE is referred by a second UE to a third UE is shown.

An information flow illustrating this is as follows:



**Figure 5.42: Refer operation**

Step-by-step description of the information flow:

1. A multi-media session is assumed to already exist between UE#1 and UE#2, established either as a basic session or by one of the supplemental services described in this clause.
2. UE#2 sends the Refer command to P-CSCF#2, containing "Refer-To" UE#F and "Referred-By" UE#2. If UE#2 knows the GRUU of UE#F and desires to reach a particular instance of UE#F, the "Refer-To" contains the GRUU of UE#F otherwise the "Refer-To" contains the Public User Identity of UE#F.
3. P-CSCF#2 forwards the message to S-CSCF#2
4. S-CSCF#2 invokes whatever service logic is appropriate for this request. If UE#2 does not subscribe to a transfer service, service logic may reject the request. If S-CSCF#2 service logic requires that it remain on the path for the subsequent request, the service logic generates a private URI, addressed to itself, the "Refer-To" value in the request with the private URI.
5. S-CSCF#2 forwards the message to S-CSCF#1
6. S-CSCF#1 invokes whatever service logic is appropriate for this request. To hide the identities of UE#2 and UE#F, S-CSCF#1 service logic stores the "Refer-To" and "Referred-By" information and replaces them with private URIs.
7. S-CSCF#1 forwards the message to P-CSCF#1